TWO NEW CALIFORNIA PLUME MOTHS

(*LEPIDOPTERA—PTEROPHORIDÆ*)

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The author would like to express his sincere thanks and appreciation to Messrs. August Busck, T. Bainbrigge Fletcher, H. H. Keifer, and Drs. J. F. Gates Clarke and J. McDunnough who have coöperated in many ways to make this contribution possible.

A description of two apparently new pterophorids is presented, with notes on their life histories. One species is of particular interest in California, because of its economic importance.

Platyptilia antirrhina Lange, New Species

A small, grayish-brown species with an expanse of from 15-19 mm. The larvae feed on the cultivated snapdragon, *Antirrhinum* species.

Holotype, male: Alar expanse 18 mm. Palpi exceeding vertex; color dark brown with white markings; slightly ascending; first segment basally with continuous row of white scales and a white patch above at junction with second segment; second segment brown with white scales below and above; third segment with white scaling at apex. Head dark brown; frontal tuft little produced, truncate in front. Antennae dark brown, basally with banded effect due to white scales; slightly ciliate, with serrate effect caused by projecting scales; apex with few lighter scales. Thorax concolorous with head; patagiæ with grayish cast. Forewings dull, dark gray-brown with reddish and black markings; triangle present above base of cleft, black, indefinite; ground color of first lobe reddish-brown, with two triangular black dashes, one on costa, the other below the center followed by the usual subterminal transverse white line; area beyond transverse line to termen reddish-brown with some grayish-white scales; apex produced with termen sloping inwardly; costal margin slightly darker than the basal two-thirds of wing; cilia of termen of first lobe mostly grayish-white, darker at base; forewing cleft two-thirds from base; cilia of cleft grayish-white, with dark tuft just inside anal angle; second lobe with grayish indefinite line immediately below cleft, extending into first lobe; subterminal white line reduced to two white patches of scales, rest of lobe a dark reddish-brown; cilia grayish-white with dark bases, separated in two places by light scales; toward anal angle cilia verge on fuscous with bases still darker; inner margin with grayish-white to fuscous cilia with several tufts of isolated fuscous spatulate scales. Hindwings fuscous with fuscous cilia; cilia with dark bases on outer margin of first lobe; first lobe slightly inflated, second terminating in a blunt point; third lobe with a well marked scale tuft near apex, triangular in appearance as the outer scales are shorter; inner margin lined with scattered spatulate fuscous scales to base of lobe. Abdomen lighter in front, rest fuscous; vestiture slightly rough, with few lighter scales on each side of dorsum. Forelegs with femora dark brown with a light stripe on each side; tibiae with a dark brown stripe which extends along the tarsal segments, a lateral darker stripe and a tuft of hairs distally; tarsal segments light brown laterally, darker line above. Middlelegs as forelegs except for two tibial spurs. Hindlegs long, femora and tibiae dark brown; two pairs of tibial spurs, one three-fifths from base, a second, at end of tibiae; first pair of spurs longer than second; tarsal segments with dark bands, last three segments lighter.

Allotype, female, as male except slightly lighter and larger.

Male genitalia figured.[1] Harpes (valves) with a cucullus (hook) at apex. Uncus long and slender, but much stouter than *crenulata* B. & McD. Aedeagus well developed, projecting through two partition-like structures. Female genitalia figured. Genital opening situated in a chitinous tube, projecting a short distance beyond the sternite of abdominal segment VII. Signum of bursa found as two well developed spines, basally serrate. (See figure.)

Holotype, male, reared from an egg hatching on November 11, 1938, from adults reared from snapdragon, *Antirrhinum* species, collected a Kelseyville, Lake County, California, the adult emerging April 27, 1939. The duration of the different stages of the holotype is as follows: November 11, 1938, egg hatched; December 1, second instar; December 11, third instar; March 1, 1939, fourth instar; pre-pupal, March 24; pupated March 29; adult emerged April 27, 1939. This rearing took place at outside Half Moon Bay temperatures.

Allotype, female, with same data as the holotype, collected as larva on June 6, 1939, the adult emerging July 14, 1939.

Thirty paratypes, seventeen males and thirteen females, all from snapdragon at Kelseyville during 1938-39.

Two paratypes, male and female, collected as pupa and larva on snapdragon at San Leandro, California, on July 7, 1939, adults emerging July 22 and 28 respectively.

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[1] The male and female genitalia figured are drawn to the same scale and can be superimposed on each other to obtain relative sizes.

Twelve paratypes, five males and seven females, collected at light at Petaluma, California, by Mr. William Bauer with data as follows: October 23, 1937, one male; October 24, 1937, one male, one female; October 25, 1937, two males, one female; October 26, 1937, four females; April 3, 1938, one female; November 1938, one male.

P. *antirrhina* is related to *taprobanes* Felder (*brachymorpha* Meyr., P. *crenulata* B. & McD.). It has been known in California for a number of years as the Snapdragon Plume Moth under a number of names, including *taprobanes* Felder, *marmarodactyla* Dyar, and *acanthodactyla* Hbn. It can be distinguished from the *taprobanes* group by its larger size, darker color, male and female genitalia and certain differences in the characters of the larvae. The male genitalia of *antirrhina* is considerably larger than *crenulata* B. & McD. from Florida or *taprobanes* Felder from India. (See figures.) The aedeagus in *crenulata* is more slender than in *antirrhina*. In the female genitalia the genital tube surrounding the ostium in *crenulata* is larger than *antirrhina* and in the latter it projects out slightly from the inwardly curved margin of abdominal segment VII. The spines of the signum in *crenulata* have a few small teeth apically, in *antirrhina* the teeth are larger and placed basally.

The synonomy of *taprobanes* Felder in Fletcher's "Life Histories of Indian Microlepidoptera"[2] may not be generally available and for convenience is presented here.

Platyptilia taprobanes Felder

Amblyptilia taprobanes Felder

Platyptilia brachymorpha Meyr.

Amblyptilia seeboldi Hofmann

Platyptilia crenulata B. & McD.

Platyptilia acanthodactyla var. *phoenicodactyla Chrétien*[3]

Platyptilia terlizzii Turati[4]

I am not able because of lack of material to cast judgment upon the distinctness of *crenulata* B. & McD. and *taprobanes* Felder, but the male genital characters of a specimen of the latter species from Pusa, India, kindly sent me by Mr. Fletcher does not agree with *crenulata* from Florida. Superficially the two agree very closely. The U. S. National Museum has kindly loaned me three cotypes of *crenulata* through Mr. Busck from which the present study of *crenulata* has been made.

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[2] T. B. Fletcher. Gov. of India Sci. Mon. No. 2, Calcutta, p. 5, 1932.

[3] T. B. Fletcher considers this probably distinct.

Turati considers this distinct, according to Fletcher.

The immature stages of *taprobanes* Felder as given by Mr. Fletcher in his Indian life histories in the reference already cited agrees with *antirrhina* in many respects, but *antirrhina* entirely lacks the conspicuous secondary setae described by Mr. Fletcher as "abdominal segments distinct, covered with very minute scattered black spinous hairs". The pupa of *taprobanes* is more attenuated than *antirrhina,* judging from Fletcher's figure.

It remains for students of this group to carefully record details in the life histories and immature stages of this group which apparently are feeders on members of the Scrophulariaceae.

A species which may be confused with *antirrhina* is P. *"acanthodactyla"* Hbn., inasmuch as it is found on snapdragon. The adults of "acanthodactyla" have the scale tuft of the secondaries just beyond the center of the lobe instead of at the end. The larvae show a purple and green form as in *antirrhina,* but differ in structure and are larger when mature. The dorsal blade-like processes of the pupa of *"acanthodactyla"* readily separate the two. This California species known as "acanthodactyla" Hbn. selects *Mimulus, Scrophularia, Stachys, Pentstemon* and related plants and does not agree in all details with European material, but for the present can be placed under this name.

The sage worm, P. *marmarodactyla* Dyar[5] has been reared by the author from several *Salvia* species in California and reared specimens could be separated on the basis of the host preference. The pupa of *marmarodactyla* Dyar has dorsal blade-like processes which places it in the group with *acanthodactyla* and *punctidactyla.*

The life history of P. *antirrhina* as far as it is known is presented at this time.

EGG: Ovate to elliptical; glossy. Color yellowish. Usually laid on horizontal axis, but can also be laid on end. Length 0.39-0.44 mm., width 0.24-0.26 mm. Surface of egg distinctly reticulated.

The eggs are laid on the underside of the leaves, on the stems or on the flowers or green seedpods. The egg period during November 1938 for Half Moon Bay outside temperatures was 20 days; for laboratory temperatures 12-15 days.

The eggs of plume moths show specific differences for use in their separation, and although a reticulation of the egg is found in other plume moths, its presence in this species can be used to separate it from the related species. *"Acanthodactyla"* has an egg showing a slight reticulation under high powers of the microscope, but in *antirrhina* the reticulated surface is visible even with the naked eye.

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[5] Synonymous with P. *fuscicornis* Zeller, according to Meyrick. (See Ent. News, Vol. 33, pp. 311, 1922.

PLATE 32

Egg of *Platyptilia antirrhina*, new species, enlarged x 45.

Larval Instars: Four larval instars are found. The first two and sometimes the third are spent in a leaf mining existence in the snapdragon leaves. Larger larvae bore inside the stems, feed on the flowers, or bore inside the green seed-pods.

First Instar.[6] Length 0.97 mm.; width at thorax 0.18 mm. Greatest width at anterior end. Color pale yellowish-green. Head reddish-brown. Cervical shield and anal plate light brown. Tubercles conspicuous, brown. Legs all concolorous with body.

Second Instar: Length 1.76 mm. (extended); width 0.22 mm. Color pale green, later turning darker. Head, cervical shield and anal plate dark brown. Setae and tubercles as in first instar.

Third Instar: Length 3.08 mm; width at thorax 0.53 mm. Color pale green. Cervical shield and anal plate brown. Setae long, white, slightly clubbed apically. Dorsal vessel shows through as a darker longitudinal line. Setigerous tubercles brown, conical. Legs and underside of body green. Spiracles dark ringed, raised.

Fourth Instar: Length 9-10 mm.; width at first abdominal segment 1.58 mm. Color green or purplish-red (two forms). Body tapering anteriorly and posteriorly from abdominal segments 2-3. Primary setae whitish, arising from black tubercles, slightly swollen apically. Dorsal vessel shows as in third instar and paired testes show in males as lighter areas. Two subdorsal whitish lines, somewhat interrupted. A substigmatal whitish line. Head green with dark ocelli. Spiracles black-ringed, raised. All legs concolorous with body in green form. The setal formula is figured. Verrucae present. A trisetose prespiracular setal group (Kappa group) on prothorax, (in some specimens only bisetose). In some specimens an additional set between Ia and

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[6] Measurements from living specimens and are given as being only approximate.

IIa. Setae IV-V and VII form verrucae on certain segments. Mandibles with 4 well developed teeth. Crochets of stalk-like prolegs in a uniordinal semi-circle, 9-10 in number.

Pupa: Length 8-10 mm. Angulate. Greatest width at anterior end, 1.63 mm. Background color varies considerably, from brownish to pinkish-white. A variable amount of fuscous suffusion occurs in different individuals. Prothorax with two converging ridges extending noticeably to abdominal segment 3. Abdominal segments 1-7 with a pair of small, anteriorly projecting spine-like processes placed on each side of the dorsum. Usually with two darker blotches on each side of abdominal segments 1-3, with variable dark markings on the wing cases, appendages and thorax. A subdorsal dark line on abdomen and a similar substigmatal line. Cremasteric and dorsally grooved, with two areas of attachment, set with many hooked setae. Front produced as a truncate ridge downwardly. Pilifers present as side lobes below the labrum. Mesothoracic legs extend to sixth abdominal segment. Metathoracic legs, present, but reduced.

The pupa is naked, suspended by the cremasteric end from the underside of the leaves, seed pods, stems or leaf petioles.

There are apparently two broods in northern California, with a possibility of a third in the more southern localities. The broods overlap considerably so that on the older plants many or all stages can be found. In the laboratory at Half Moon Bay a complete life history from egg to adult took 83-94 days during the period November 1938 to February 1939, while the period at outside temperatures was 166-184 days.

Adults in resting hold the wings outstretched and slightly tilted forwards, and have a peculiar habit of "flitting" the wings up and down. They are not strong fliers and rest during the day on the plants from which they can be "flushed".

This species is apparently widely distributed in California as in addition to the type localities it has been reported on snapdragon at Berkeley, Hayward, Lakeport, and Los Angeles. It often does serious damage to snapdragon seedlings in nurseries where no control measures are practiced, and on the older plants destroys the green seeds.

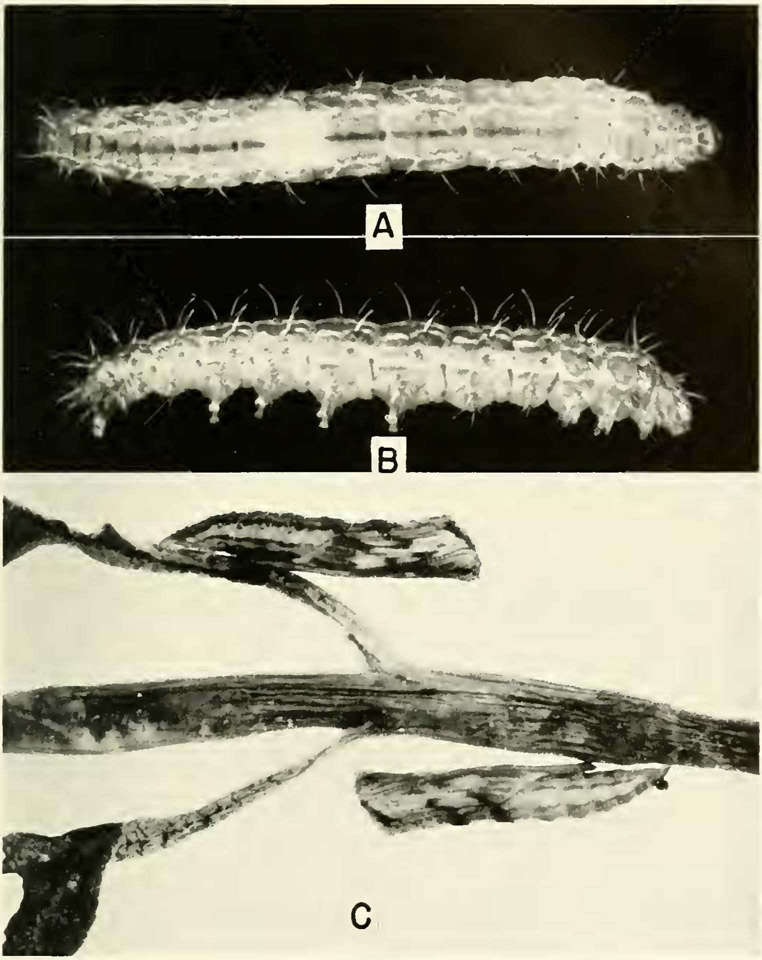


PLATE 33

A-B. Dorsal and lateral aspects of mature larva of *Platyptilia antirrhina*, enlarged approximately x 10.

C. Pupae of P. *antirrhina* on snapdragon, enlarged approximately x 5.

TRICHOPTILUS POTENTELLUS Lange, New Species

A very small dark brown species with white markings; expanse 7-8.5 mm. The larvae feed externally on *Potentilla californica.*

Holotype, male: Alar expanse 8.5 mm. Palpi long, slender, brown and white, slightly exceeding vertex; first segment with whitish scaling basally; second segment brown with white scaling, a tuft projecting under third segment; third segment brown with a white tip above. Head brown with a few white scales, a tuft of brown and white scales projecting over the head to base of antennae. Eyes large. Antennae brown and white banded; scape white striped below. Thorax concolorous with head; patagiae tipped with white scaling. Forewings uniform dark brown with white fasciae and markings; cleft before center into two slender lobes; first lobe with two white fasciae, one less than half-way distant from base, the other, reduced, beyond center; cilia dark brown except for two white patches at apex and three white areas along posterior margin; base of cleft with a longitudinal white line extending a short distance along the posterior margin; second lobe with two white fasciae as in first lobe; ciliae dark brown with white tuft at apex and white scaling at fasciae; a white scaling below cleft on inner margin and another about halfway to base of wing; costal margin with scattered white scales to beyond cleft; cilia show an occasional dark scale at base; undersurface showing fasciae as on uppersurface. Hindwings with the lobes very slender; concolorous with forewings; cilia long with white tuft on apex of first lobe, rest brown; third lobe with few white scales, but no scale tuft along posterior margin. Abdomen dark brown with partial transverse bands of white; basally with white scaling which runs laterally approaching the center in three areas, one near base, again near the center, and a third band near the posterior end; ventrally with white scaling at the intersegmental areas. Legs chiefly white from above with brown bands; forelegs with femora and tibiae brown, longitudinally white striped; tibiae distally enlarged ending in a tuft overlapping tarsal segments; tarsi whitish with brown at the joints; middlelegs with longitudinal white striping; tibia with a tuft just beyond center composed of brown scales, some tipped with white; a long spine from mid-tuft reaching end of tibia; tibia enlarged distally, with a tuft of brown scales and two spines which reach the end of the first tarsal segment; tarsal segments white above, with brown at joints, beneath brown predominating.

Male genitalia figured. Harpes (valves) small, simple, with a basal roughened area corresponding to a sacculus. Aedeagus evidently moves upwardly describing an arc, attached at the center to a ventral process. Uncus absent. Female genitalia figured. Ostium opening through a well developed chitinous genital tube, which projects out a considerable distance from the abdomen. An examination of T. *californicus* Wlshm. shows a similar chitinous tube, this feature therefore, should be a valuable one in taxonomic work in this group.

Allotype, female, as male; alar expanse 7 mm.

Holotype, male, reared from a larva collected March 8, 1939, at Half Moon Bay, California, on *Potentilla californica* (C. & J.) Greene, emerging on June 18, 1939.

Allotype, female, with the same data, emerging May 17, 1939.

Potentellus is apparently the smallest pterophorid of our fauna reported to date. It agrees with *parvulus* B. & L. in lacking scale tufts on the third feather of the secondaries. *Parvulus*, however, judging from the description of the unique female from Louisiana has prominent longitudinal stripes on the abdomen, is larger, and shows differences in markings and coloration. *Potentellus* has a partial transverse banding of the abdomen.

T. *pygmaeus* Wlshm., the other small species in the genus, is larger than *potentellus*, lighter in color, and in most specimens has scale tufts on the third feather of the secondaries. Dr. J. F. Gates Clarke has reared *pygmaeus* in British Columbia from *Arctostaphylos columbiana* Paper.

A description of the known early stages of *potentellus* is presented at this time.

MATURE LARVA: Length 3.4 mm. Color green. Slightly flattened, tapering anteriorly and posteriorly from center. Head black, noticeably elongated, subconical. Primary setae long, white, swollen apically. Secondary setae present on abdominal segments as short, white, apically enlarged spines.

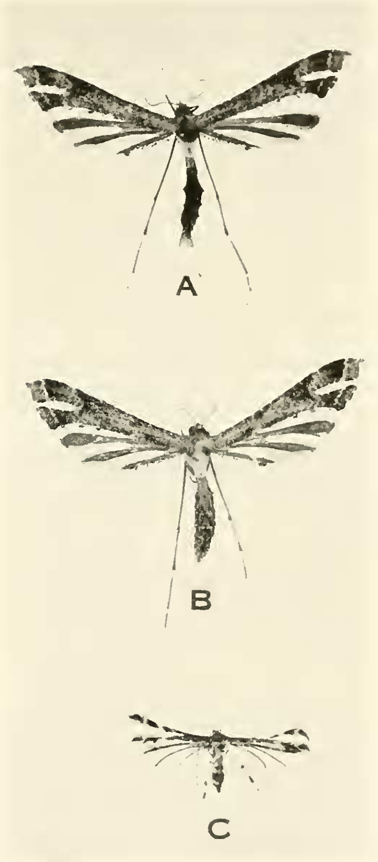


PLATE 34

A. Holotype, male, of *Platyptilia antirrhina*, new species, enlarged x $2\frac{1}{2}$.

B. Allotype, female, of P. *antirrhina*, enlarged x $2\frac{1}{2}$.

C. Holotype, male, of *Trichoptilus potentellus*, new species, enlarged x 3.

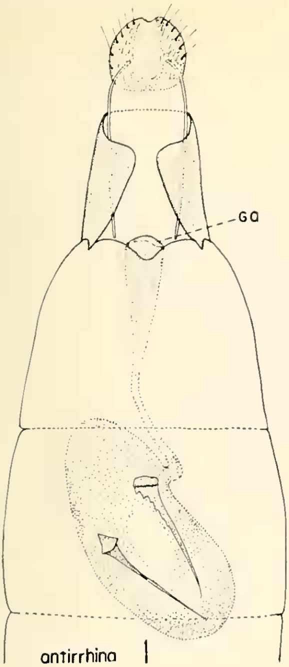
Skin spinules present, seen under magnification, abundant at intersegmental areas. A trisetose prespiracular group (Kappa group) on the prothorax. True legs large, well developed, tarsal claws long. Prolegs stalk-like, first paid reduced in size; crochets of all except anal pair, 3-5 in number arranged in a uniordinal outer band; anal prolegs enlarged, with 6-7 crochets in a semicircle.

The larvae feed externally on the pubescent and somewhat glandular foliage. Several collections of foliage from the original locality have failed to reveal additional material.

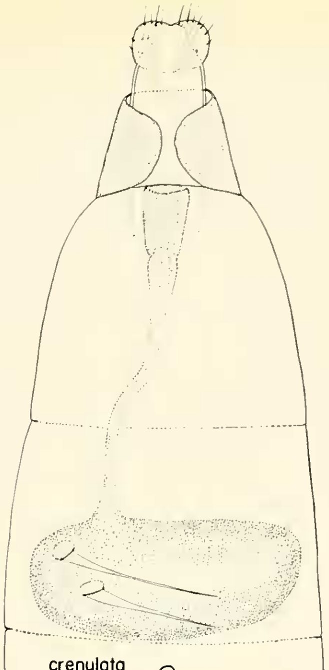
Pupa: Length 3.52 mm.; greatest width at mesothorax 0.84 mm. Color greenish to dark brown. Mesothorax with a medial longitudinal ridge; laterally with two ridges which at the vertex are set with two tubercles, then running as ridges to the second abdominal segment. Front produced downwardly as a blunt projection; laterally above, with a nodular projection on each side so that front appears concave from above. Pilifers present as triangular lobes below labrum. Maxillae well developed. Mesothoracic legs extend to end of wing cases. Abdomen, thorax and head clothed with rather long, white, apically swollen setae. Subdorsal setal group arising from a raised tubercle consisting of an anterior and posterior projecting seta and on certain segments a medial, short, blunt spine. Abdominal segments from 3 posteriorly with an additional pair of subdorsal posteriorly projecting spines. Wing cases longitudinally striate; striations tuberculate. Antennae tuberculate. Spiracles conspicuously raised. Cremasteric end with two areas of attachment; set with numerous hooked setae.

Pupation occurs externally on the leaves, attached by the cremasteric end. The pupal period of the allotype was twenty-four days under laboratory conditions.

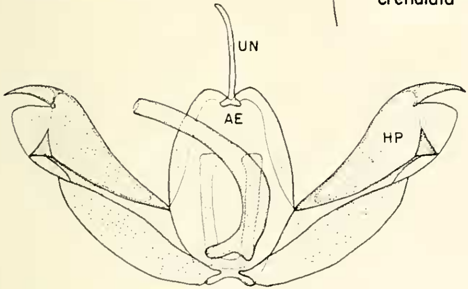
Types to be deposited in the collection of the California Academy of Sciences, with paratypes of *antirrhina* to be widely distributed as usual, and in addition to Dr. John A. Comstock for the Los Angeles Museum, Capt. W. P. Medlar for the San Diego Museum and Mr. William Bauer of Petaluma. Specimens of *antirrhina* have been sent prior to its description to Dr. J. McDunnough and Mr. T. B. Fletcher.



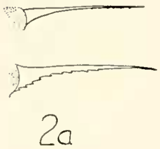
antirrhina 1



crenulata 2



antirrhina 3



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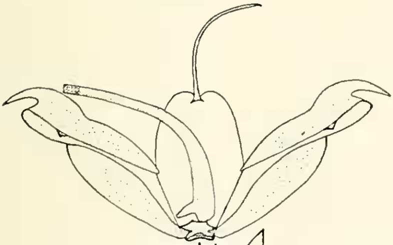
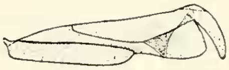


crenulata 4



taprobanes 5

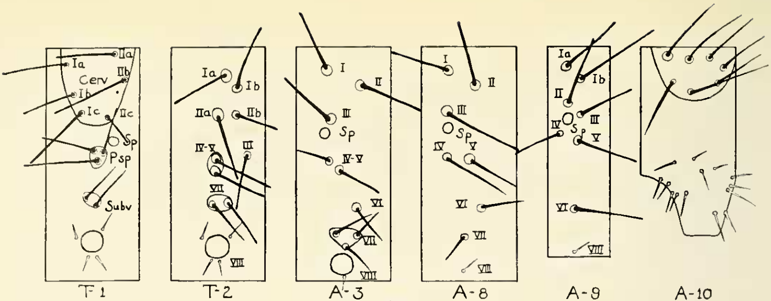
PLATE 35

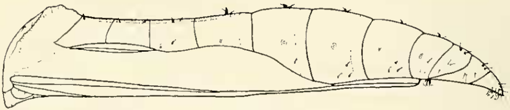
WHL

Fig. 1. *Platyptilia antirrhina* Lange, female genitalia.
Fig. 2. *Platyptilia crenulata* B. & McD., female genitalia.
Fig. 2a. Above, spine of signum of P. *crenulata;* below, spine of P. *antirrhina.*
Fig. 3. *Platyptilia antirrhina* Lange, male genitalia.
Fig. 4. *Platyptilia crenulata* B. & McD., male genitalia.
Fig. 5. *Platyptilia taprobanes* Felder, right harpe.

ABBREVIATIONS USED

AE—Aedeagus.	HP—Harpe (valve).
GO—Genital opening (ostium).	UN—Uncus.





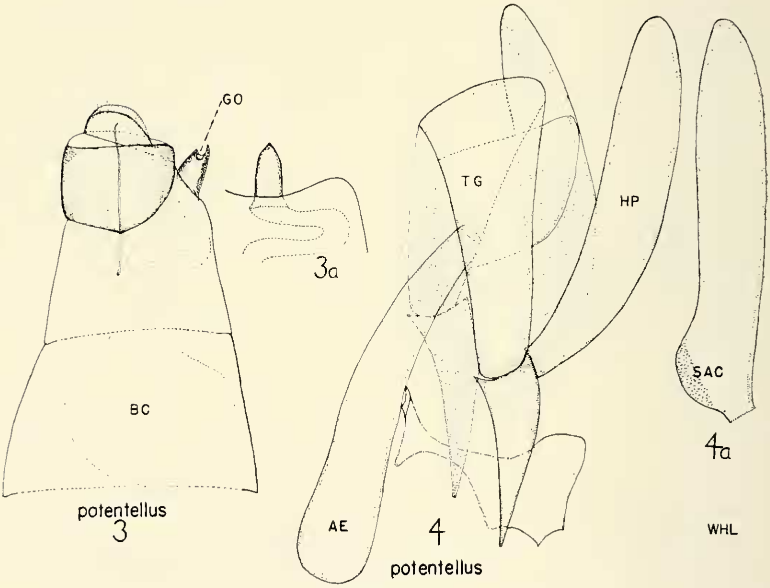


PLATE 36

Fig. 1. *Platyptilia antirrhina* Lange, setal formula of larva.

Fig. 2. P. *antirrhina*, pupa from lateral aspect.

Fig. 3. *Trichoptilus potentellus* Lange, female genitalia from lateral aspect.

Fig. 3a. Same, external genital tube from ventral aspect.

Fig. 4. T. *potentellus*, male genitalia from lateral aspect.

Fig. 4a. Same, harpe from inner aspect.

ABBREVIATIONS USED

AE—Aedeagus.
BC—Bursa copulatrix.
Cerv.—Cervical shield.
GO—Genital opening (ostium).
HP—Harpe (valve).
Psp—Prespiracular wart (verruca).
SAC—Sacculus of harpe.
Sp—Spiracle.
Subv—Subventral wart (verruca).
TG—Tegumen.